WHAT IS CLAIMED IS:

1. A target for measuring the relative positions between two layers of a device, said target comprising:

a first periodic structure over a first layer of the device; and

a second periodic structure over a second layer of the device, said second periodic structure overlying or interlaced with said first periodic structure.

2. The target of claim 1, wherein the first periodic structure has a first selected width, and the second periodic structure has a second selected width, the second selected width being less than the first selected width.

3. The target of claim 1, wherein said second periodic structure extends further to an area where said first periodic structure does not extend.

4. The target of claim 1, wherein the first layer is etched silicon, and the second layer is resist.

5. The target of claim 1, wherein said first periodic structure has a trapezoidal shape, the first layer is silicon dioxide, and the second layer is resist, the first layer and the second layer being separated by an uniform polysilicon layer.

6. The target of claim 1, wherein said first periodic structure is tungsten and has a concave-trapezoidal shaped top, the first layer is oxide, and the second layer is resist, the first layer and the second layer being separated by an aluminum blanket.

7. The target of claim 1, further comprising unpatterned semiconductor, metal, or dielectric layers deposited or grown on top of, underneath, or between the first and the second layers.

8. The target of claim 1, wherein a layer that is the topmost layer is resist.

9. The target of claim 1, wherein the first periodic structure has been exposed to radiation for patterning purposes of a semiconductor wafer.

10. The target of claim 1, further comprising:

a third periodic structure that is substantially perpendicular to said first periodic structure, said third periodic structure over the first layer; and

a fourth periodic structure that is substantially perpendicular to said second periodic structure, said fourth periodic structure over the second layer and overlying or interlaced with said third periodic structure.

11. The target of claim 1, wherein said first periodic structure has at least two interlaced grating lines having different periods, line widths or duty cycles.

12. The target of claim 1, wherein said second periodic structure has at least two interlaced grating lines having different periods, line widths or duty cycles.

13. A method for making a target, comprising:

placing a first periodic structure over a first layer of a device; and

placing a second periodic structure over a second layer of a device, wherein said second periodic structure is overlying or interlaced with said first periodic structure.

14. The method of claim 13, wherein said placing a second periodic structure includes placing said second periodic structure on an area to where said first periodic structure does not extend.

15. The method of claim 13, further comprising exposing the first periodic structure to radiation for patterning purposes of a semiconductor wafer.

16. The method of claim 13, further comprising:

placing a third periodic structure over the first layer, wherein said third periodic structure is substantially perpendicular to said first periodic structure; and

placing a fourth periodic structure over the second layer, wherein said fourth periodic structure is substantially perpendicular to said second periodic structure.

17. The method of claim 13, wherein said placing a first periodic structure includes placing at least two interlaced grating lines having different periods, line widths or duty cycles.

18. The method of claim 13, wherein said placing a second periodic structure includes placing at least two interlaced grating lines having different periods, line widths or duty cycles.

19. A method for providing a database to determine misalignment of overlying or interlaced periodic structures, comprising:

providing information related to thickness, refractive index, extinction coefficient, or critical dimension, and misalignment of periodic structures that overly or interlace one another;

deriving from said information data related to radiation diffracted by the structures in response to a beam of radiation; and

constructing a database correlating the misalignment and the data.

20. The method of claim 19, further comprising calculating a differential intensity, a differential phase, or a differential polarization angle from the data.

21. A method for detecting misalignment of overlying or interlaced periodic structures, comprising:

illuminating the overlying or interlaced periodic structures with incident radiation;

detecting diffracted radiation from the illuminated portions of the overlying or interlaced periodic structures to provide an output signal; and

determining a misalignment between the structures from the output signal.

22. The method of claim 21, wherein said determining includes comparing the output signal with a reference signal.

23. The method of claim 22, wherein the reference signal comprises a database.

24. The method of claim 21, wherein the output signal contains information related to ellipsometric parameters.

25. The method of claim 21, wherein overlying or interlaced periodic structures has at least two interlaced grating lines having different periods, line widths or duty cycles; the incident radiation is incident on the structures at an oblique angle; and the diffracted radiation comprises zero-order diffraction.

26. The method of claim 21, wherein overlying or interlaced periodic structures has at least two interlaced grating lines having different periods, line widths or duty cycles; the incident radiation is incident on the structures at a normal angle; and the diffracted radiation comprises zero-order diffraction.

27. The method of claim 21, wherein the incident radiation is substantially normal, and the diffracted radiation comprises positive first-order diffraction and negative first-order diffraction.

28. The method of claim 21, further comprising calculating a derived signal from the output signal.

29. The method of claim 28, wherein the derived signal contains information related to intensity, phase, or polarization angle.

30. The method of claim 28, wherein the derived signal contains information related to differential intensity, differential phase, or differential polarization angle.

31. The method of claim 28, further comprising providing a neutral polarization angle or quasi-neutral polarization angle; and wherein said determining a misalignment includes determining a misalignment by comparing the derived signal with the reference signal near the neutral polarization angle or the quasi-neutral polarization angle.

32. The method of claim 31, wherein the derived signal is compared with the reference signal for polarization angles within about five degrees of the neutral polarization angle or the quasi-neutral polarization angle.

33. An apparatus for detecting misalignment of overlying or interlaced periodic structures, comprising:

a source providing polarized incident radiation beam to illuminate the overlying or interlaced periodic structures;

at least one analyzer collecting diffracted radiation from the structures;

at least one detector detecting diffracted radiation collected by the analyzer to provide output signals; and

a signal processor determining any misalignment between the structures from the output signals.

34. The apparatus of claim 33, wherein the source provides incident radiation beam having an oblique angle of incidence to illuminate the overlying or interlaced periodic structures, and the detector detects zero-order diffraction.

35. The apparatus of claim 33, wherein the source provides a normal incident radiation beam to illuminate the overlying or interlaced periodic structures, and the detector detects zero-order diffraction.

36. The apparatus of claim 33, wherein the source includes a polarizer and a device causing relative rotational motion between the polarizer and the analyzer.

37. The apparatus of claim 33, wherein said at least one analyzer comprises a first analyzer collecting positive first-order diffracted radiation and a second analyzer collecting negative first-order diffracted radiation; and said at least one detector comprises a first detector detecting positive first-order diffracted radiation, and a second detector detecting negative first-order diffracted radiation.

38. The apparatus of claim 37, wherein the signal processor calculates a derived signal from the output signals.

39. The apparatus of claim 38, wherein the derived signal contains information related to a differential intensity, a differential phase, or a differential polarization angle.

40. The apparatus of claim 38, wherein the source includes a polarizer and a device causing relative rotational motion between the polarizer and the analyzers.

41. The apparatus of claim 40, wherein the derived signal contains information related to a differential polarization angle or a phase difference derived from ellipsometric parameters.

42. An apparatus for detecting misalignment of overlying or interlaced periodic structures, comprising:

a source providing polarized incident radiation beam to illuminate the overlying or interlaced periodic structures;

two analyzers collecting first-order diffracted radiation from the structures, the first-order diffracted radiation comprising a positive first-order diffraction and a negative first-order diffraction;

a first device interfering the positive first-order diffraction and the negative first order diffraction from the analyzers to provide a combined diffracted radiation signal;

a detector detecting the combined diffracted radiation signal to provide output signals; and

a signal processor determining any misalignment between the structures from the output signals.

43. The apparatus of claim 42, wherein the output signal contains information related to phase difference between the positive first-order diffraction and the negative first-order diffraction.

44. An apparatus for making overlying or interlaced periodic structures and detecting misalignment between the overlying or interlaced periodic structures, comprising:

a deposition instrument to provide the overlying or interlaced periodic structures;

a source providing polarized incident radiation beam to illuminate the overlying or interlaced periodic structures;

at least one analyzer collecting diffracted radiation from the structures;

at least one detector detecting diffracted radiation collected by the analyzer to provide output signals; and

a signal processor determining any misalignment between the structures from the output signals and providing the misalignment to the deposition instrument.

45. The apparatus of claim 44, wherein the source provides an incident radiation beam having an oblique angle of incidence to illuminate the overlying or interlaced periodic structures, and the detector detects zero-order diffraction.

46. The apparatus of claim 44, wherein the source provides a normal incident radiation beam to illuminate the overlying or interlaced periodic structures, and the detector detects zero-order diffraction.

47. The apparatus of claim 44, wherein the source includes a polarizer and a device causing relative rotational motion between the polarizer and the analyzer.

48. The apparatus of claim 44, wherein said at least one analyzer comprises a first analyzer collecting positive first-order diffracted radiation and a second analyzer collecting negative first-order diffracted radiation; and said at least one detector comprises a first detector detecting positive first-order diffracted radiation, and a second detector detecting negative first-order diffracted radiation.

49. The apparatus of claim 48, wherein the signal processor calculates a derived signal from the output signals.

50. The apparatus of claim 49, wherein the derived signal contains information related to a differential intensity, a differential phase, or a differential polarization angle.

51. The apparatus of claim 49, wherein the source includes a polarizer and a device causing relative rotational motion between the polarizer and the analyzers.

52. The apparatus of claim 51, wherein the derived signal contains information related to a differential polarization angle or a phase difference derived from ellipsometric parameters.

53. An apparatus for making overlying or interlaced periodic structures and detecting misalignment between the overlying or interlaced periodic structures, comprising:

a deposition instrument to provide the overlying or interlaced periodic structures;

a source providing polarized incident radiation beam to illuminate the overlying or interlaced periodic structures;

two analyzers collecting first-order diffracted radiation from the structures, the first-order diffracted radiation comprising a positive first-order diffraction and a negative first-order diffraction;

a first device interfering the positive first-order diffraction and the negative first order diffraction from the analyzers to provide a combined diffracted radiation signal;

a detector detecting the combined diffracted radiation signal to provide output signals; and

a signal processor determining any misalignment between the structures from the output signals and providing the misalignment to the deposition instrument.

54. The apparatus of claim 53, wherein the output signal contains information related to phase difference between the positive first-order diffraction and the negative first-order diffraction.